9th Class 2018

Physics	Group-I	
Time: 1.45 Hours	(Subjective Type)	Pa... Mark...

(Part-I)

2. Write short answers to any FIVE (5) questions

(i) Define Plasma Physics and Geophysics.

Ans **Plasma Physics:**

It is the study of production, properties of the ... state of matter -- the fourth state of matter.

Geo-physics:

It is the study of the internal structure of the Earth

(ii) What do you mean by scientific notation? ... its one example.

Ans A simple but scientific way to write large or s... numbers is to express them in some power of ten. ... Moon is 38,40,00,000 meters away from the E... Distance of the moon from the Earth can also ... expressed as 3.84×10^8 m. This form of expressi... number is called the scientific notation.

(iii) Change 15 years age into seconds.

Ans $= 15 \times 365 \times 24 \times 60 \times 60$

$= 47,30,40,000$ seconds

(iv) Define translatory motion and give an examp...

Ans In translatory motion, a body moves along a ... without any rotation. The line may be straight or curve...

Example:

A car moving in a straight line has translatory m...

(v) Define acceleration and write its unit.

Ans Acceleration is defined as the rate of chan... velocity of a body.

SI Unit:

SI unit of acceleration is ms^{-2}.

(vi) State Newton's first law of motion.

Ans The Newton's first law of motion states that:

"A body continues its state of rest or of uniform motion in a straight line provided no net force acts on it."

(vii) Why rolling friction is less than sliding friction?

Ans When the axle of a wheel is pushed, the force of friction between the wheel and the ground at the point of contact provides the reaction force. The reaction force acts at the contact points of the wheel in a direction opposite to the applied force. The wheel rolls without rupturing the cold welds. That is why, wheel's rolling friction is extremely smaller than sliding friction.

(viii) When a gun is fired, it recoils. Why?

Ans According to law of conservation of momentum, the momentum gained by fired bullet is neutralized by equal and opposite momentum given to the gun. Which recoils back.

---

3. Write short answers to any FIVE (5) questions: 10

(i) What is second condition of equilibrium? Write its formula.

Ans According to this, a body satisfies second condition for equilibrium when the resultant torque acting on it is zero.

Mathematically, $\Sigma\tau = 0$.

(ii) Define resolution of forces.

Ans Splitting up of a force into two mutually perpendicular components is called resolution of that force.

(iii) State Newton's law of gravitation.

Ans According to Newton's law of gravitation:

Everybody in the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres.

is why, we do not feel it.

(v) Define field force and gravitational fi

Ans Field force:

The velocity of a body, thrown
decreasing while, in return, its velocity goes
This is due to gravitational pull of the Earth
body whether the body is in contact with
Such a force is called the field force.

Gravitational field strength:

The gravitational force per unit mass
gravitational field strength of the Earth.

(vi) Define power and write its SI unit.

Ans Rate of doing work is called **power.**

SI unit:

SI unit of power is watt (W).

(vii) A body of mass 50 kg is raised to a h
What is its potential energy? (g = 10

Ans

Mass m = 50 kg
Height h = 3 m
$g = 10\ ms^{-2}$

as P.E. = m g h

$\therefore$ P.E. = 50 kg × 10 ms^{-2} × 3 m
= 50 × 10 × 3 J
= 1500 J

The potential energy of the body is 1500

(viii) What is meant by nuclear energy?

Ans Nuclear energy is the energy released ir
nuclear radiations in addition to heat and
nuclear reactions such as fission and fusion re

4. Write short answers to any FIVE (5) questions: 10

(i) Define pressure and write its SI unit.

Ans The force acting normally per unit area on the surface of a body is called pressure.

Pressure is a scalar quantity. In SI units, the unit of pressure is Nm^{-2} also called pascal (Pa). Thus

$$1\ Nm^{-2} = 1\ Pa$$

(ii) The mass of 200 cm^3 of stone is 500 g. Find its density.

Ans $V = 200\ cm^3 = 0.02\ m^3$

$m = 500\ g = 0.5\ kg$

$d = ?$

$$d = \frac{m}{V}$$

$$d = \frac{0.5}{0.02} = 25\ kgm^{-3}$$

(iii) What is barometer? Explain it.

Ans Barometer is a device used to measure the atmospheric pressure of air.

(iv) Convert 100°F into the temperature on Celsius scale.

Ans Conversion of 100°F into the temperature on Celsius scale:

$$F = 100°F$$

Since $1.8C = F - 32$

$\therefore$ $= 100 - 32$

or $1.8C = 68$

or $C = \frac{68}{1.8}$

or $C = 37.8°C$

Thus, 100°F is equal to 37.8°C.

(v) Define specific heat and write its mathematical formula.

Ans Specific heat of a substance is the amount of heat required to raise the temperature of 1 kg mass of that substance through 1 K.

Its mathematical formula is:

$$c = \frac{\Delta Q}{m\Delta T}$$

(vi) What is meant by convection currents in air?

Ans Gases also expand on heating, thus convection currents are easily set up due to the differences in the densities of air at various parts in the atmosphere.

(vii) Define radiation.

Ans Radiation is the mode of transfer of heat from one place to another in the form of waves is called electromagnetic waves.

(viii) Write two names of expert thermal climbers.

Ans Eagles, Hawks and Vultures are expert thermal climbers

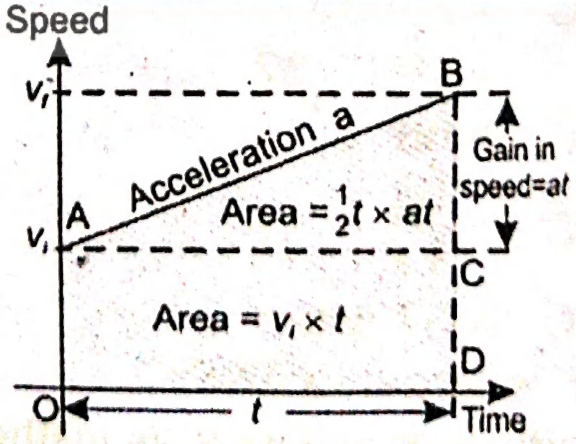
(Part-II)

Note: Attempt any TWO (2) questions.

Q.5.(a) Derive the second equation of motion with the help of speed-time graph. (4)

Ans **Second equation of motion:**

In speed-time graph shown in the following figure the total distance S travelled by the body is equal to the total area OABD under the graph.



Total distance S = area of (rectangle OACD + triangle ABC)

Area of rectangle OACD = OA × OD

= $v_i \times t$

Area of the triangle ABC = $\frac{1}{2}$(AC × BC)

$= \frac{1}{2} t \times at$

Since Total area OABD = area of rectangle OACD + area of triangle ABC

Putting values in the above equation, we get

$$S = v_i t + \frac{1}{2} t \times at$$

$$S = v_i t + \frac{1}{2} at^2$$

(b) How much centripetal force is needed to make a body of mass 0.5 kg to move in a circle of radius 50 cm with a speed 3 ms^{-1}? (5)

Ans Data: $m = 0.5$ kg

$r = 50$ cm $= 0.5$ m

$v = 3\ ms^{-1}$

Formula: $F = \frac{mv^2}{r}$

$$F = \frac{0.5 \times (3)^2}{0.5}$$

$$F = 9 \text{ N}$$

Q.6.(a) Write the four uses of solar energy. (4)

Ans Following are the four uses of solar energy:

(i) Solar energy is used to generate electricity with solar cells or heat engines.

(ii) Solar energy is used as heat for making hot water, heating buildings and cooking.

(iii) Solar energy is used by plants for the process of photosynthesis.

(iv) Solar energy is used to take the salt away from sea water.

(b) Find the perpendicular components of a force of 50 N making an angle of 30° with x-axis. (5)

Ans Data: $F = 50$ N

$\theta = 30°$

$F_x = ?$

$F_y = ?$

Formula: $F_x = F \cos \theta$

$F_x = 50 \times 0.866$

$F_x = 43.3$ N

Formula: $F_y = F \sin \theta$

$F_y = (50) \sin 30$

$F_y = (50)(0.5)$

$F_y = 25$ N

Q.7.(a) Define linear thermal expansion in solid Derive its formula: $L = L_o (1 + \alpha \Delta T)$ (4

Ans Linear Thermal Expansion in Solids:

It has been observed that solids expand on heati and their expansion is nearly uniform over a wide range temperature. Consider a metal rod of length L_o at certa temperature T_o. Let its length on heating to a temperatu T becomes L. Thus

Increase in length of the rod = $\Delta L = L - L_o$

Increase in temperature = $\Delta T = T - T_o$

It is found that change in length ΔL of a solid directly proportional to its original length L_o, and th change in temperature ΔT. That is:

$$\Delta L \propto L_o \Delta T$$

or $$\Delta L = \alpha L_o \Delta T$$

or $$L - L_o = \alpha L_o \Delta T$$

or $$L = L_o (1 + \alpha \Delta T)$$

Hence given equation is proved.

(b) **The head of a pin is a square of side 10 mm. Find pressure on it due to a force of 20 N.** (5)

Ans Data: $A = (10 \times 10^{-3})(10 \times 10^{-3})\ m^2$

$F = 20\ N$

$P = ?$

Formula: $P = \frac{F}{A}$

Putting values, we get

$$P = \frac{20}{(10 \times 10^{-3})(10 \times 10^{-3})}$$

$$P = \frac{20}{(10 \times 10)(10^{-6})}$$

$$= \frac{\cancel{20}}{\cancel{100}} \times 10^{6}$$

$$= \frac{1}{5} \times 10^{6}$$

$$= 2 \times 10^{6}$$

$$= 2 \times 10^{6-1}$$

$$= 2 \times 10^{5}\ Nm^{-2}$$